

Multi-Functional Machine with Electro-Magnetic Clutch

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Abstract— This paper takes into consideration the concept of Multi-Functional Machine for especially for generation base businesses. Main aim is to ensure the low generation cost, hardware cost and low stock expense. Now a days the invention are targeted so as to produce in such a way that it provides a quick yet effective solution as innovation headway yet this progression likewise requests gigantic ventures and consumption, Heavy profit is to be obtained but not compromising with the quality of produced machine. We have built up a machine which could perform in a multidimensional way, and also being productive at the same time. In this machine we are really offering drive to the primary shaft to which scotch burden system is legitimately connected, scotch burden instrument is utilized for sawing task. Fundamental uses slope gear framework to provide power transmission at two areas. Through slant gear we will offer drive to boring focus and crushing focus. The representation encourage us to get the activity performed at various working focus all the while as it is getting drive from single power source. Goal of this prototypical are lookout of power (regulator source), decrease in expense related with power use, increment in efficiency.

Keywords— *Electro-Magnetic Clutch, Multi-Functional Machine.*

I. INTRODUCTION

Ideally we know industries stands for Production of required products at low manufacture charge, equipment charge and moderate storage charge. Now a days each endeavour have been accelerated and swift due to technical knowledge improvement but this improvement too demand large speculations and expenditure, each fabrication targets to fabricate high productivity rate sustaining the quality and standard of the product at moderate mean cost .Mainly in production a significant part of speculations is done machinery erection. So in this paper we have a shown a machine which can perform tasks like penetrating, sawing, building, some lathe processes at disparate labouring areas at the same time which infers that industrialist don't have to bother paying

for machine performing those tasks independently for operating operation at the same time.

II. EXPLORATORY SET-UP

In this proposal, we have provided the gear technique in order to provide power transfer at various operating areas , typically gear is a rotatory machine part comprising of teeth, or cogs, which interconnects with additional toothed part so as to transfer turning force, over a large scale, with teeth on the one gear being of same form, then frequently also with that form on the later gear. Two or more gears operating in cohesion are called a transmission and can generate mechanical suitability by a gear ratio and hence may be defined a simple machine. Geared devices can alter the speed, torque, as well as way of a power source. The commonly occurring case is for a gear to interconnect with another gear; however, a gear can also interconnect with a non-spinning toothed portion, called a rack, thereby making translational motion in its place of rotatory motion.

III. OPERATIONAL STANDARD (COMPONENTS)

Here only two considerable standards on which we proposed our machine (theoretical display) operates:

1. Scotch-Yoke system
2. Power transmission through gears (bevel gear)

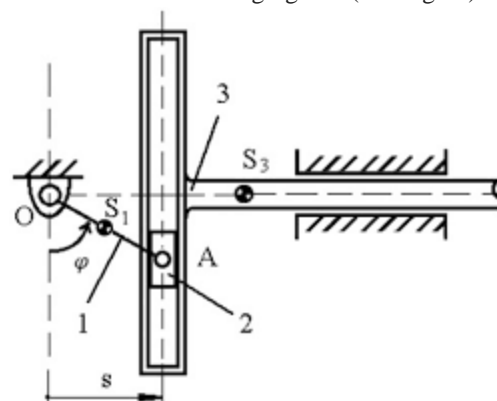


Fig.1: Scotch yoke mechanism

The Scotch Yoke (else name dun locked assembly tool) is a responding drive system, altering ended the direct movement of a slider into revolving drive, or the different mode nearby. The cylinder or other responding part is directly linked to a sliding burden with a space that connects in a stick on the latter.

Slope gears are important when the course of a pole's pivot should be altered. They are basically placed on slides that are 90 degrees left, however can be made to work at other edges also. The teeth on incline instruments can vary from straight, winding or hypoid.



Fig.2: bevel gear

Central function:

The three tasks are drilling, pounding and cutting. The reason for the machine is to reduce the assembling time and cost reduction. A similar machine is used for doing all these three activity, rather than using separate machines, for example, penetrating machine, granulating machine and hacksaw cutting machine.

1. Drilling

Penetrating is a cutting procedure that uses a penetrating device to cut a hole of roundabout irritate-area in strong materials. The penetrating apparatus is normally a rotatory cutting device, commonly multi-point. The bitsqueezed alongside the work-piece and hinged at proportions from hundreds to thousands of rounds for each moment. This energises the forefront against the work-piece, cutting off chips from the hole as it is bored.



Fig. 3: Drilling tool

CUTTING

Cutting is process in which we cut an workpiece or object into at least two parts. In cutting there are two type of stress are generate first one is compressive stress another one is shear stress.

The least difficult pertinent condition is pressure = F/A here,

F=force

A= area

The pressure produced by a slicing execute is straightforwardly corresponding to the power with which it is connected, and contrarily relative to the territory of contact. Thus, the littler the zone (i.e., the more honed the cutting actualize), the less power is expected to cut something. It is by and large observed that forefronts are more slender for cutting delicate materials and thicker for harder materials. This movement is seen from kitchen blade, to knife, to chop out, and is a harmony between the simple cutting activity of a meager sharp edge versus quality and edge sturdiness of a thicker sharp edge.



Fig.4: Cutting tool

2. Grinding

Grinding is machining processes in which we use a grinding wheel consist of an abrasive compound for machining operation. The grinding wheels are consumable but life of different grinding wheel can vary, it depends on the type of their stone used. It is mainly made of aluminium oxide or silicon carbide or ceramics. In grinding process speed is very high as compare to other

machining process so their may use of coolant should be there to avoid overheating. Grinding is used to provide high surface quality, shape and, size.



Fig.5: Grinding tool

Material-specification

1. Transformer
2. Gear
3. Dc gear motor
4. Conveyor belt
5. Capacitor
6. Diode
7. Cast iron rod
8. Pulley
9. Electromagnetic clutch



Fig.6: Project components and tools

3. Transformer

Numerous advanced brightening, highlight and scene lighting apparatuses require just 12 volts of rotating current (AC) to work. Since the ordinary energy running into your home or trade is 120 to 278 volt. By the help of

transformer we can step down the voltage upto 12 volt on which our dc gear motor work.



Fig.7: Transformer

4. Gear

Gear is a mechanical device use for transfer of power from one shaft two another shaft. The speed of gear depend on the gear ratio means the ratio of teeth of driven and driving gear. In power transmission from one gear two another the larger diameter gear is gera and smaller one is called as pinion gear. It is mainly use for varying speed. It is used in industries ,automobiles ,watches.



Fig.8: Gear

5. DC Gear Motor

An adapted DC Motor has an apparatus gathering connected with the engine. The speed of engine is measure in terms of RPM (Revolution per minute) .It is mainly used in lower voltage supply.In this gear and motorare combined together for working.



Fig. 9: DC gear motor

6. Conveyor Belt

A conveyor belt system is used for transferring power from one pulley to another pulley. These belt are made of thermoplastics, metal, rubber, leather and fabric.

Types of conveyor belt:

1. Gravity conveyor
2. Wire mesh conveyors
3. Plastic belt conveyors
4. Elastic conveyors
5. Perpendicular conveyors



Fig. 10: Conveyor Belt

7. Capacitor

A capacitor is a small battery which stores some electrical energy. It is mainly used for power conditioning, signal coupling or decoupling and also for remote sensing.



Fig. 11: Capacitor

8. Diode

It is an electronic device in which current moves only in one direction. It is basically a semiconductor device which has two terminals: one is p and the other is n, in which current flows in one direction. Diodes are made of semiconductors; for example, silicon and germanium are some of its types.



Fig.12: Diode

9. Cast iron rod

Cast iron bar is utilized for connecting the pulleys and to append the electromagnetic grip on it, and furthermore for fixing the apparatus on it.



Fig.13: Cast iron rod

10. Pulley

A pulley is a wheel on a pivot or shaft that is planned to help progress and modify the course of a snug linkage or belt, or interchange of intensity among the pole and link or belt. On account of a pulley upheld by an edge or shell that does not interchange capacity to a pole, still is used to control the linkage or apply a power, the backup shell is identified as a square, and the pulley might be identified as a sheave.

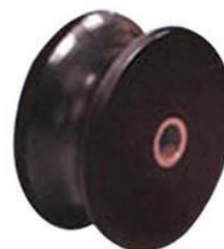


Fig.14: Pulley

11. Electromagnetic clutch

Electromagnetic grips are most reasonable for remote activity since no mechanical linkages are required to control their commitment, giving quick, smooth task. Notwithstanding, on the grounds that the initiation vitality disperses as warmth in the electromagnetic actuator when the grip is locked in, there is a threat of high temperature. Consequently, the peak risky employed heat of the grip is constrained by the heat rating of the safety of the electromagnet. This is a notable captivity. Another impairment is higher introductory expense.



Fig.15: Electromagnetic clutch

IV. THEORETICAL SPECIFICATION

- i. Dimension of the typical: length=75 cm, width=60 cm, height=30 cm.
- ii. For gear: Base radius. =20mm, pitch cone angle=55 degree, pitch dia. = 40 mm.
- iii. For Pinion Base radius. =1.4cm, Pitch Cone Angle=35 Degree, pitch dia. = 28 mm.
- iv. Bevel gear: no. of teeth T1=12, T2=9.
- v. Roller bearings of inner dia.=9.6 mm
- vi. Constituent of bevel gears steel.
- vii. Rod is also of steel.
- viii. Size of Binding = 30 mm.
- ix. Wideness of belt= 15 mm.
- x. Diameter of pulley= 60 mm.
- xi. Belt type = V-belt.
- xii. Structure is built of woodland
- xiii. Shaft dia. =10 mm (round), shaft length=2.5ft.

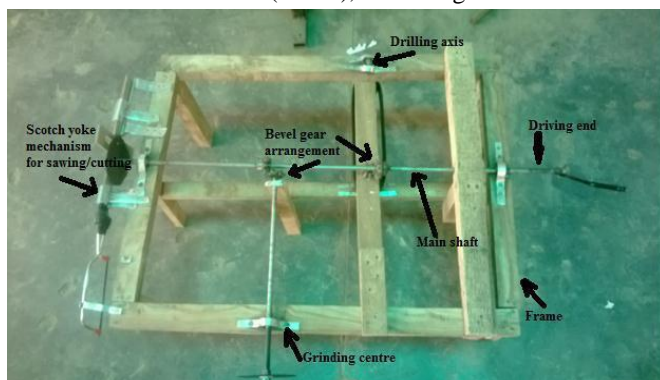


Fig.16: Multi-Function Operating Machine: A Theoretical Model

V. CALCULATION

Our primary point is to speak to our creative idea, we have taken some helpful information from our applied model and attempted to assess the rate deviation from the standard determined qualities which is as per the following:

Since pitch sweep of pinion is $r_p = 14$ mm, pitch span of rigging $r_g = 20$ mm.

By the connection among pitch cone edge and speed proportion we can discover the speed proportion as we have pitch cone plot for both rigging and pinion as 55 deg. furthermore, 35 deg.

$\tan Y_p = \sin B / (W_p / W_g) + \cos B$ Where B is the edge between the pole.

On placing $B=90^\circ$ and $Y_p=39^\circ$ we get $W_p / W_g = 1.234$ for example our speed proportion is 1.428.

Presently for the two complete upheaval of principle shaft the Penetrating slide and

Granulating shaft ought to have no of insurgency = 2.858 (tentatively)

In any case, from our model the no of transformation estimated at penetrating and crushing axis = 2.68 (for example two complete insurgency in addition to 240 pivot).

Rate blunder in power transfer = $(2.858 - 2.68) / 2.856 * 100 = 6.18\%$

Presently measurement of round plate of scotch burden mechanism = 78mm

Real estimated powerful blow size of drag = 76mm

Rate blunder in the stroke length = $(78 - 76) / 78 * 100 = 2.56\%$

Essentially numerous estimations of rpm at penetrating and crushing pivot can be estimated on changing the contribution; in this calculated model feed to the work piece is given through the work table.

As the prototypical is exposed to grating in this way there is a mistake of 6.18% and 2.56% amid power transmission and transverse movement of sawing edge separately.

VI. CONCLUSION

We perceive that all the generation centred ventures required low creation charge and extraordinary work level which is conceivable by the use of multi-work working machine which will reduce power just as fewer time, later this machine gives functioning at various focus it truly diminished the time utilization up to apparent edge. In an industry a considerable bit of speculation is being made for hardware establishment. Therefore in this paper we have planned a machine which can perform tasks like boring, cutting, crushing at various working focuses all the while which indicates that manufacturer have not to recompense for machine performing above assignments autonomously for working task concurrently.

Since this machine will perform diverse activities all the while this machine can be used in remote spots where

power is unpredictable or lacking. It very well may be used for light obligation cutting and boring activities of compressed wood. Likewise the granulating task can be utilized to sharp the instruments edges just as to evacuate additional materials its functioning should be possible in less floor space. Untalented work can similarly deal with it effectively as a result of this we can diminish the expense of production which is the most important factor in production industry.

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